Investigations of type-I ELMs induced edge barrier collapse at ASDEX Upgrade by applying the group delay spectrogram slices technique

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The injection of cryogenic deuterium pellets in the ASDEX Upgrade has not only represented a successful option for ELM pace making but it has been also shown a promising technique to investigate ELM physics. The edge barrier collapse induced by spontaneous and pellet triggered ELMs has been characterized by means of the Group Delay Spectrogram Slices (GDSS) technique[1] based on the reflectometry group delay. Main experimental results[2] are here presented.

The analysis of the behaviour of the density layers at the plasma edge revealed small differences between the two types of ELMs. With the GDSS technique we are able to detect profile steepening and fuelling effects due to pellet injection, mainly at the HFS. The presence of asymmetries between HFS and LFS in the ELM dynamics has also been studied by evaluation the ELM onset time on both sides. The barrier collapses are observed to be nearly coincident within the diagnostic time resolution. In our new findings, which apply to both spontaneous and triggered ELMs, there is no clear evidence of long HFS/LFS delays as previously observed for spontaneous ELMs[3].

In order to validate the accuracy of the GDSS technique in the ELM onset time evaluation, the GDSS analysis has been checked against the "standard" radial displacements of density layers analysis and the "new" group delay distribution width analysis.

[1] L. Fattorini *et al*, 7th International Reflectometry Workshop for Fusion Plasma Diagnostics (2005) 137.
[2] L. Fattorini *et al*, Plasma Phys. Contr. Fusion **50** (2008) 125001.
[3] I. Nunes *et al*, Nuclear Fusion **44** (2004) 883.